Pre- and Post TMDL Success Stories

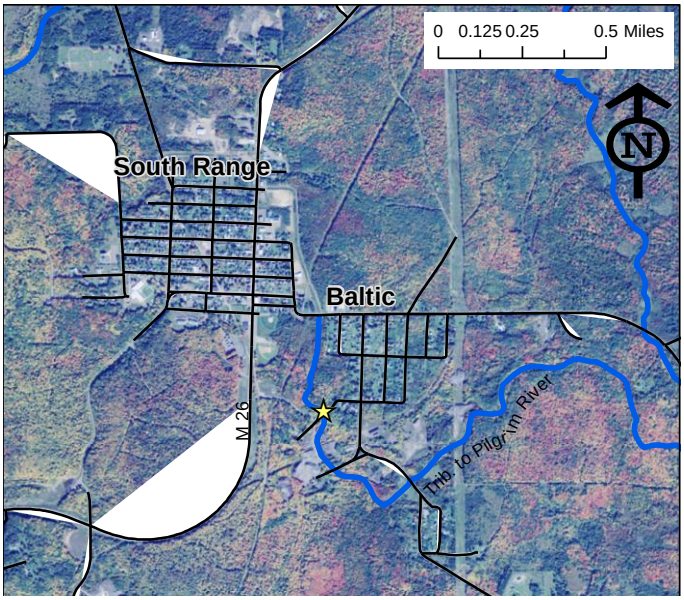


Figure 1. Map of the Baltic, Michigan area. Sampling site is marked with a star.

Success Story – Elimination of Raw Human Sewage Discharges to an Unnamed Tributary to the Pilgrim River, Houghton County

An unnamed tributary to the Pilgrim River in Houghton County, Adams Township was appropriately known to local residents as “the Baltic Sewer” (Taft 1997). Sewage from local residences discharged via straight pipes to hill sides and flowed downhill or seeped into the ground in old mining depressions. Additionally, sewage was also directly entering surface waters via a makeshift collection system that discharged directly to the tributary. Sampling of a discharge pipe just upstream of Laitila Rd contained *E. coli* concentrations greater than 10,000. Downstream of that pipe, the tributary had a geometric mean of 2,160 *E. coli* per 100mL (Kohlhepp 2007). At that time, this tributary (AUID 040201030302-02), was put on the 2008 federal Clean Water Act Section 303(d) List as impaired by *E. coli*, and a Total Maximum Daily Load was scheduled for 2014.

In 1990, Upper Peninsula District staff entered into a compliance agreement with Adams Township that required the township to set up an escrow account to fund construction of a sewer system to eliminate the raw sewage discharges from a population of 1000. The population was scattered in four former mining locations: Atlantic Mine, Trimountain, Painesdale and Baltic. The township had previously been offered a 75% grant for the system by EPA, but were unable to secure the local share due their low median household income/unaffordably high monthly rates that would be needed to repay the loans. The township collected and saved $10 per household per month. These savings were used to reduce monthly sewer rates once the systems were built. Sewer systems/lagoons were constructed sequentially for each location as grant/loan monies became available from US Rural Development Administration, culminating with the construction of the collection system for Baltic in 2011. Connections to the new sewer were made slowly, but finally in September 2013 all raw sewage discharges had been eliminated.

In October 2013 the DEQ collected 5 weeks of *E. coli* samples from the tributary at Laitila Rd at the same location where high *E. coli* was recorded previously. The results showed that the total and partial body contact WQS are being met in the tributary (Table 1). This water body was listed as fully attaining the total and partial body contact WQS in the 2014 Integrated Report and no TMDL was needed, thanks to the efforts of Adams Township, many MDEQ employees, and the Western UP District Health Department.

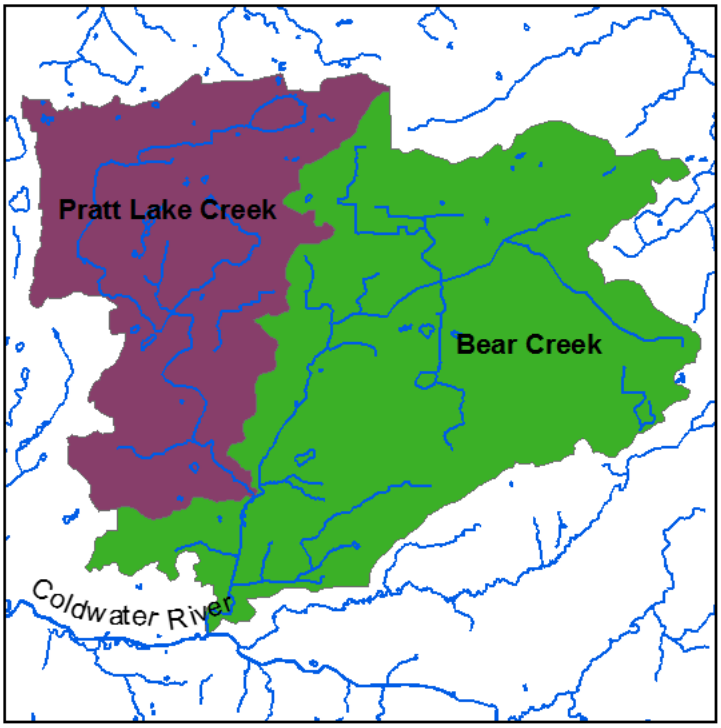
Table 1. MDEQ E. coli data collected after illicit connections and failing septics were remedied.

		Trib to Pilgrim River			**24-hour prior precipitation**
Date		Sample Results	Daily Geometric Mean	30-Day Geometric Mean	
10/3/2013	L	**250**			
	C	**200**			
	R	**340**	**257**		**0.25**
10/9/2013	L	**12**			
	C	**23**			
	R	**16**	**16**		**0**
10/17/2013	L	**64**			
	C	**48**			
	R	**43**	**51**		**trace**
10/24/2013	L	**80**			
	C	**54**			
	R	**50**	**60**		**trace**
10/31/2013	L	**44**			
	C	**70**			
	R	**77**	**62**	**60**	**0.1**

Tyler Creek: Incremental Steps to Improvement

While meeting the water quality standard is the ultimate goal of most of Michigan's water quality restoration projects, success cannot only be defined in simple terms, particularly when there are multiple sources and the problem has a large magnitude. Tyler Creek (also known as Bear Creek) is a large tributary of the Coldwater River, both tributaries of the Thornapple River, which are located in Kent, Ionia, and Barry Counties, Michigan. Tyler Creek is locally important for its natural beauty and value as a coldwater fishery. It also has highly agricultural portions, with a large livestock population and with many areas relying on septic systems (Figure 2). It was first listed as impaired by *E. coli* in the 1998 Integrated Report. The TMDL (approved by the USEPA in 2005) identifies agricultural nonpoint sources and failing septic systems as the main contributor of *E. coli*, along with a Dairy Concentrated Animal Feeding Operation (CAFO). In 2004, 30-day geometric mean *E. coli* concentrations ranged from 69 to 814 *E. coli* per 100 ml. Since that time, the MDEQ has administered several grants intended to further identify and reduce sources of *E. coli* in Tyler Creek.

The Coldwater River has an MDEQ and USEPA approved Watershed Management Plan, which was written in 2004 and updated to meet the USEPA's Clean Water Act Section 319 nine required elements in 2009. To meet the goals of the WMP, Timberland Resource Conservation and Development and other partners used a detailed stream inventory to identify sources and causes of pollution, implementing physical best management practices (BMPs) at 14 sites (Timberland Resource Conservation and Development 2013). This project included an education and outreach program, and used *E. coli* monitoring to pinpoint specific sources and locations for future implementation of BMPs. Partners included Coldwater River Watershed Council, Tyler Creek Golf Course Swisslane Farms (CAFO), and Trout Unlimited Chapters.



Name:	*Pratt Lake Creek*	*Bear Creek*
HUC-12 (subwatershed):	*040500070305*	*040500070306*
Size:	*18 sq. mi.*	*30 sq. mi.*
Agricultural Landcover:	*72%*	*78%*
Developed Landcover:	*8%*	*6%*
Wetland Loss since Presettlement:	*28%*	*44%*
Estimated Land with Manure Spreading:	*6%*	*10%*
Human Population:	*1000*	*2050*
Estimated Number of Septic Systems:	*270*	*810*

Figure 2. Subwatershed characteristics for Bear and Pratt Lake Creeks, in the Tyler Creek watershed.

This project monitored Tyler Creek at 11 sites, 9 tile outlets, and several groundwater sites, and found instream *E. coli* values as high as 6,612 per 100 mls. Several tiles that were monitored only during wet weather were found to be in excess of the upper reporting limits 2,400 cfu/100 mls, with one as high as 24,000 per 100 mls. Flow and discharge monitoring enabled the calculation of *E. coli* loads at each site.

Like many streams in the Lower Peninsula of Michigan, large portions of Tyler Creek are a maintained drain. It has therefore lost much of its vegetated riparian buffers to drain maintenance activity. In addition, in many areas, the stream is hydrologically isolated from its floodplain, or simply has no floodplain, as a result of dredging and a berm created by the spoils from dredging activities. In some cases, wetlands have formed upslope of the berm, which can filter *E. coli* and other pollutants from the agricultural runoff as long as the capacity of the wetland isn't exceeded. However, when the storage capacity of these wetlands is exceeded, as it often is during heavy rains in saturated conditions, the water overflows the berm and creates an erosion issue by forming a gully. As part of the Tyler Creek Implementation project, a formerly degraded wetland was modified to repair the breach in the dredge spoil berm, the capacity of the wetland was increased, and a controlled outlet was constructed. Surface runoff from 40 acres of land (20 of which are agricultural) is now diverted via a constructed vegetated swale into the improved wetland, as opposed to direct outlet to the stream (Figure 3). The wetland was recently planted with a native seed mix. Storage volume was increased by about seven times. In another portion of this project, a wetland was constructed on the Tyler Creek Golf Course to increase infiltration from an agricultural tile drain. Monitoring found that *E. coli* levels were 58 percent lower at the outfall of a constructed wetland flowing into Pratt Lake Creek as compared to the *E. coli* levels of the agricultural drain flowing into the wetland. These results are based on limited data, but they are promising.

In 2015, human bacterial source tracking, flow, suspended solids, and *E. coli* load calculation work was conducted through a Clean Michigan Initiative – Clean Water Fund grant, by Timberland Resource Conservation and Development (Streamside Ecological Services 2015). During this study, one direct illicit discharge of untreated sewage was found, reported to the local health department, and promptly remedied. Another detection of human sewage was reported to the local health department. They found that the septic system had recently been replaced, but a sink cross connection still existed. In one other instance, the source was not

identified. From instream monitoring, *E. coli* loading was found to be correlated with suspended solids loading, and several locations with elevated runoff were identified for future projects. Bear Creek contributed more flow and a higher *E. coli* load than Pratt Lake Drain. In 2014, all sites continued to exceed the total body contact water quality standard. However, the ongoing work allows incremental progress in determining and eliminating sources in this complex agricultural watershed, and provides a basis for future targeted work.

Figure 3. Before (top-8/5/2009) and after (bottom-7/15/2015) the capacity of a streamside wetland was increased.

References:

Kohlhepp, G. E., K.; Taft, W. (2007). A Biological Survey of Lake Superior Tributaries from the Keweenaw Peninsula to the Carp River: Baraga, Houghton, Iron, Marquette, and Ontonagon Counties, Michigan. Department of Environmental Quality. Staff Report: MI/DEQ/WB-07/080.

Streamside Ecological Services (2015). Tyler Creek Monitoring Project. CMI #2013-0516., Timberland Resource Conservation and Development.

Taft, W. H. (1997). A Biological Survey of the Pilgrim River Downstream of the Historic Baltic Mining District at Painesdale, Trimountain and Baltic, MI, Houghton Cty., MI, July 9-10, 1996. Staff Report: MI/DEQ/SWQ-97/027.

Timberland Resource Conservation and Development (2013). "Final Project Report (2011-0017): Tyler Creek E. coli Reduction Project."